REMARKS

The Examiner has rejected claim 16 under 35 U.S.C. 112, first paragraph and claims 1-15 under 35 U.S.C. 103(a) as being unpatentable over Sabourin (US Patent No. 6,208,964). Claims 1-16 are pending. In response, independent claim 1 and 14 have been amended to more particularly claim the invention and overcome the 35 U.S.C. 112, first paragraph rejection. Support for amended claims 1, 14 and 16, can be found at least on page 19, line 16 through page 20, line1; and page 20, line 19, through page 21, line 9.

Applicants have also amended the Abstract, Specification and Drawing to obviate the objections by the Examiner. However, applicants respectfully note that pursuant to 37 CFR 1.81(a), "the applicant for a patent is required to furnish a drawing for his or her invention where necessary for the understanding of the subject matter sought to be patented;..." Applicants do not believe a drawing is necessary for the understanding of claim 16. Moreover, as previously indicated, claim 16, as amended, is fully supported by the specification, as least, on page 20, line 19, through page 21, line 9.

Applicants respectfully submit that the pending claims, as amended, are patentable for at least the following reasons.

Amended claim 1 is directed to a method of improving the recognition accuracy of a speech recognizer, comprising the steps of: deploying the speech recognizer in an environment to receive live

input data, receiving live input data, without supervision, applying a given adaptation algorithm to the received live input data as it is being recognized and a confidence measure to a portion of the live input data, to improve the recognition accuracy of the speech recognizer; and redeploying the adapted speech recognizer in the target environment.

Sabourin, as read by the applicants, relates to a method and apparatus for providing unsupervised adaptation of transcriptions.

Applicants can find nothing in Sabourin that teaches applying a given adaptation algorithm to the received live input data as it is being recognized and a confidence measure to a portion of the live input data, to improve the recognition accuracy of the speech recognizer; and redeploying the adapted speech recognizer in the target environment, as recited in amended independent claim 1. Amended independent claims 14 and 16 recites similar limitations.

Since Sabourin does not teach, show or suggest all of the features of amended independent claims 1, 14 and 16, as recited above, applicant respectfully submits that these claims are patentable over Sabourin.

The other claims in this application are each dependent from the independent claim discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the

individual consideration of the patentability of each on its own merits is respectfully requested.

The applicants submit that the claims fully satisfy the requirements of 35 U.S.C. 112 and 103.

In view of the foregoing amendments and remarks, entry of this amendment, favorable reconsideration and early passage to issue of the present application are respectfully solicited.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited this date with the United States Postal Service as first-class mail in an envelope addressed to:
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On July 8, 2002

By Naomi Chiapa

VERSION WITH MARKING TO SHOW CHANGES MADE

IN THE SPECIFICATION

Please replace the following paragraphs with the below written paragraphs:

The three consecutive paragraphs beginning on page 7, line13:

Figure 3~~2~~ is a graph illustrating the results of combining two adaptation algorithms, the
HMM adaptation, and the Word Bigram Statistics adaptation.--

Page 8, in the paragraph beginning on line 13, change as follows:

The routine begins at step 20 by deploying the ASR engine, for example, at a customer installation in the field. It is assumed that the ASR engine as initially deployed is imperfect and must be tuned to increase its accuracy level. At step 22, a test is run to determine whether the ASR engine has been set for automatic adaptation according to the invention. This may be achieved, for example, by extending the engine's application programming interface (API) to include a flag that may be set (e.g., by the application developer or the user) to begin the adaptation process. The flag may be set remotely after the engine has been deployed. If the engine has been set for automatic adaptation, the routine continues in step 24. At this step, a test is made to determine whether a given data-

collection period (e.g., a 24 hour period) has elapsed. If not, the routine continues at step 26 to store the recognition results, along with the associated speech waveform samples. In particular, during this step, the recognition results obtained by processing a live input 38 are saved to a disk file. As will be seen, the recognition results may include the actual results (i.e., the hypothesized spoken utterances) generated by the ASR engine, together with information such as confidence levels, n_best hypotheses, and other data which might be used as input to the adaptation algorithms in step 30.

Page 9, in the paragraph beginning on line 9, change as follows:

In a variant of step 26, the system may be configured to save a "downstream" version of the speech data (e.g., cepstral coefficients), instead of the "raw" digitized speech waveform 39 samples. This is another advantage of the present invention. In particular, because there is no requirement for humans to listen to the speech data, significant data-reduction may be obtained by storing only the form of the speech data that is required for executing the adaptation algorithms. This advantage can result in reduction in costs for computer equipment, including CPUs, IC memory, and hard disks.

Page 10, in the paragraph beginning on line 2, change as follows:

Step 26 cycles until the result of the test at step 24 is positive. At this point, the routine continues at step 28 to

retrieve the information saved during the time period. At step 30, an adaptation algorithm (or a plurality of adaptation algorithms) is executed against the information to increase the accuracy of the engine. As will be seen, this algorithm may be based on an acoustic model 33 (e.g., Hidden Markov Modeling) 34, a language model (e.g., Word Bigram Statistics) 35, a pronunciation model 36 (e.g., Phonetic Transciption) 37, or some combination of these different model types. AT step 32, the so-tuned recognition engine is then re-installed in the application, presumably with better accuracy and more efficient use of computing resources than the original engine.

The paragraph beginning on page 14, line 19:

--For these experiments, the ASR engine's first-pass Viterbi search graph was biased with word bigram data extracted from subsets of the recognition results on given development input data. The result transcriptions (i.e., recognition hypotheses) were randomized and then various sized portions, starting form the to-choice down, were taken to accumulate word pair frequencies. A variation on this experiment imposed a score threshold on the recognition results as the sub-setting mechanism. These counts were converted into probabilities, and these probabilities were used to bias the Viterbi search in favor of the most likely word sequences~~. The main results of these experiments are summarized in the table illustrated below~~

~~[Insert tables from Figures 3A and 3B]~~.--

The paragraph beginning on page 17, line 12:

--~~The tables illustrated below show the experimental results for the Names task.~~

~~[Insert tables from Figures 4A and 4B]~~ --

The paragraph beginning on page 18, line 7:

--As described earlier, each of the above approaches is fairly orthogonal. Thus, two or more of these adaptation methods may be combined to produce an additive benefit. A simple combination of the HMM and Bigram adaptation generated the results illustrated in Figure ~~2~~3. Combining these adaptation algorithms had a somewhat less than additive effect of the development test data, and a somewhat more than additive effect on the evaluation test data. The combined improvement in both cases approached 18%.--

IN THE CLAIMS

Please amend the claims as follows:

1. (Amended) A method of improving the recognition accuracy of a speech recognizer, comprising the steps of:

deploying the speech recognizer in an environment to receive live input data;

receiving live input data;

without supervision, applying a given adaptation algorithm to the received live input data as it is being recognized and —a confidence measure to a portion of the live input data, to improve the recognition accuracy of the speech recognizer; and

redeploying the adapted speech recognizer in the target environment.

14. (Amended) A method of improving the recognition accuracy of a speech recognizer deployed in an environment to receive live input data, comprising the steps of:

receiving live input data; and

without supervision, applying a given speaker-independent adaptation algorithm to the received live input data as it is being recognized and a confidence measure to a portion of the live input data, to improve the recognition accuracy of the speech recognizer. Please add new claim 15.

16. (Amended) A computer-readable memory medium, said medium including code for improving the recognition accuracy of a speech recognizer in an environment to receive live input data, the code comprising:

receiving code, to enable live input data reception;

applying code, to apply a given adaptation algorithm to ~~the~~ received live input data as it is being recognized and a confidence

measure to a portion of the live input data and thereby to improve the recognition accuracy of the speech recognizer; and

updating code, to apply the adapted speech recognizer in the ~~target~~ environment.